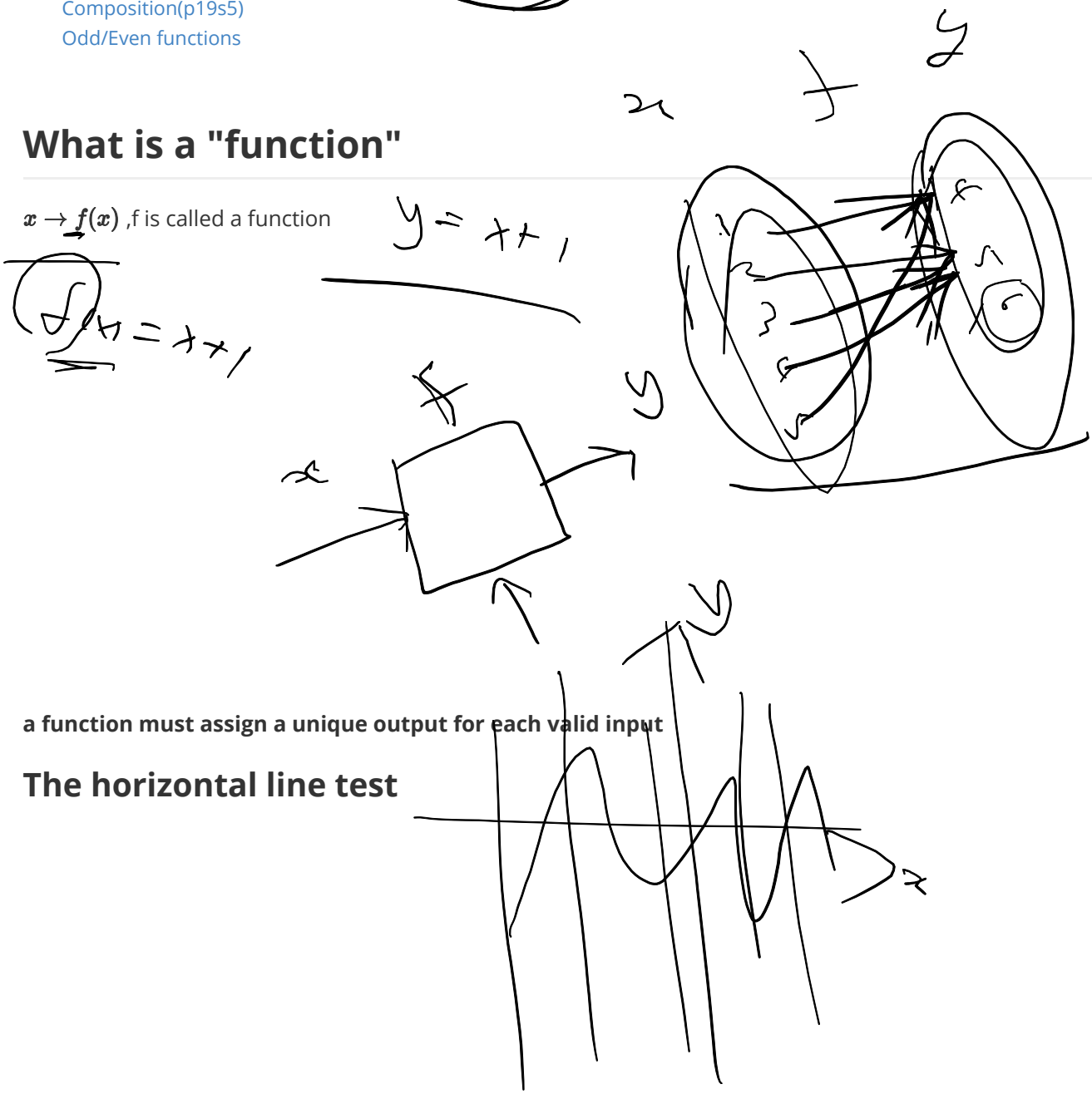
Functions

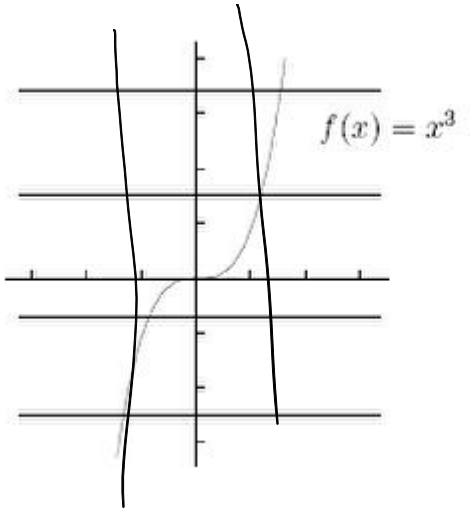
What is a "function"

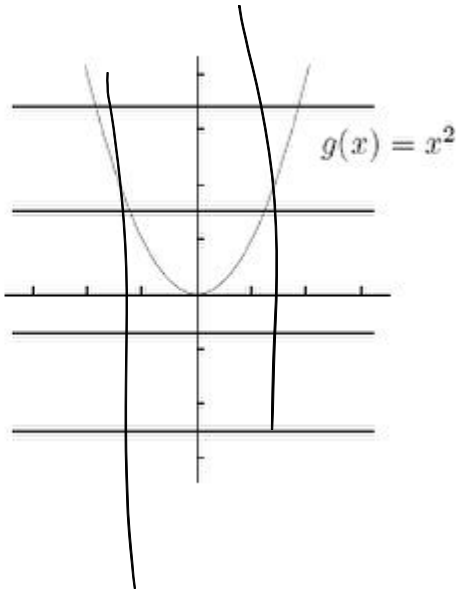
$x \to f(x)$,f is called a function



a function must assign a unique output for each valid input

The horizontal line test





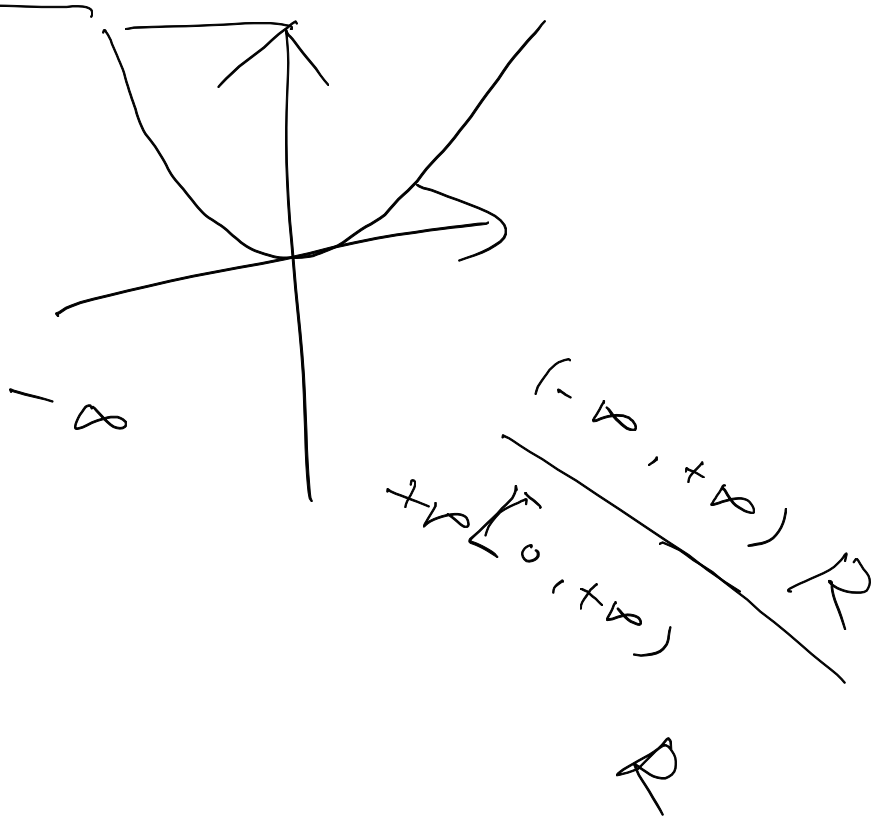
Variables Domain Codomain Range

Variables

- x :Independent variable
- $y/f(x)$: dependent variable

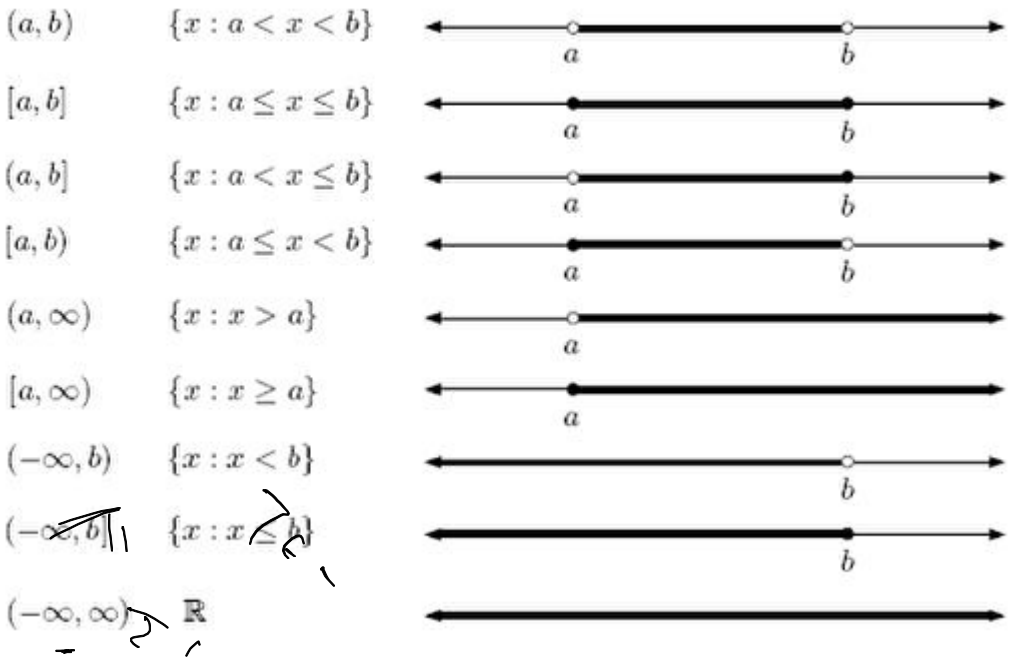
Domain Codomain Range

- Domain: a set of inputs
- ~~Codomain: a set of **possible** outputs~~
- Range: a set of **actual** outputs



*Interval notation

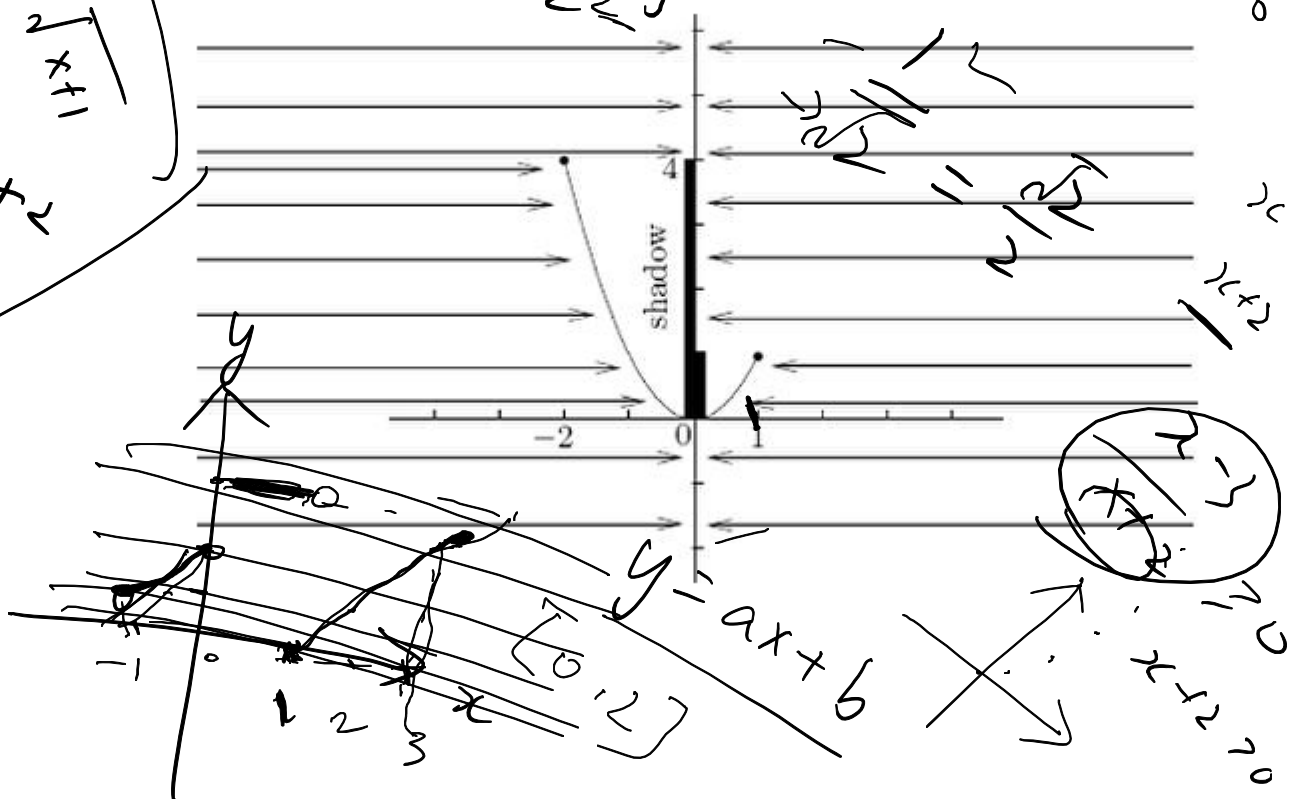
- closed: $[3, 5]$
- half-open: $(3, 5], [3, 5), [3, \infty)$
- open:$(3, 5), (-\infty, 5)$



Finding the domain(p9e1, p16mc1, p17mc4)

- The denominator of a fraction can't be zero($tan(90^o)$)
- You can't take the square, forth, sixth root ($x^{2n}, n \in N$)of a negative number.
- You can't take the logarithm of a negative number or of 0

Finding the range(p19s2)



Common Functions and Graphs(p22)

- Linear Functions
  - $y = mx + b$
- Polynomials
  - $f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$
- Rotional functions
  - $\frac{p(x)}{q(x)}$
- Exponentials and logarithms
  - $y = n^x$
  - $y = log_a n$
- Trig functions
  - $sin(x), cos(x), tan(x) \ldots$
- Functions involving absolute values

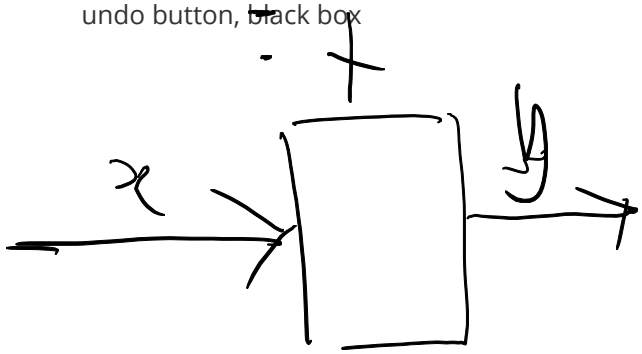
Inverse function

let $f(x) = y$. Starting with the output y, the **new function** finds the one and only input x which leads to the output. The **new function** is called the *inverse function* of f, and is written as f^{-1}.

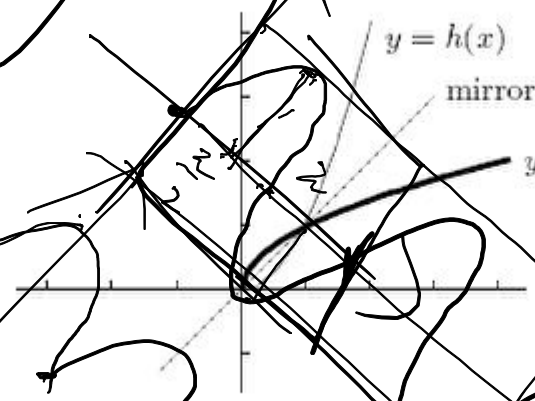
$$f(x) = y, f^{-1}(y) = x$$

$domain \leftrightarrow range \; range \leftrightarrow domain$

undo button, black box



finding the inverse function and restricting the domain(p13e6)



Inverses of inverse functions(p20s7)

$$f^{-1}(f(x)) = x$$
$$f(f^{-1}(y)) = y$$

domain and range!

Composition(p19s5)

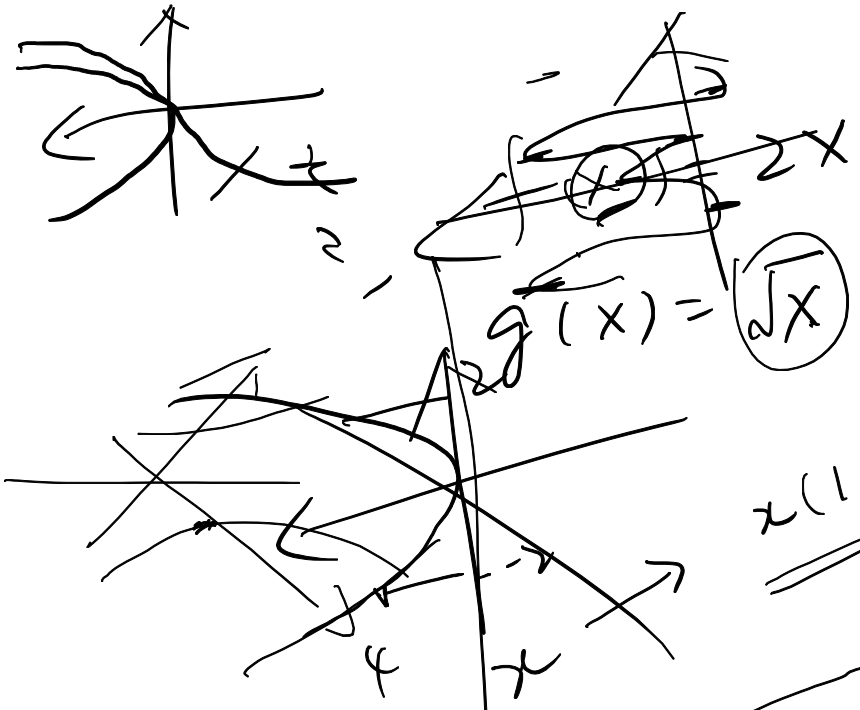
$$k(x) = f(g(h(j(x))))$$
$$k = f \circ g \circ h \circ j$$

Odd/Even functions

Even functions: $f(x) = f(-x)$

Odd functions: $f(x) = -f(-x)$

with graphs:



$g(x) = \sqrt{x}$

$f[g(x)] = 2\sqrt{x}$

$g[f(x)] = \sqrt{2x}$

$x(1+12\%)$

$x(1+12\%)(1-12\%)$

$1-12\times 0.88$

$h(x) = f(x)\cdot g(x)$

$h(-x) = f(-x)\cdot g(-x)$

$f(x)\cdot(-g(x))$

$+\log_2^2 = 3$

2^2

2^3

$\frac{6}{5}\cdot\frac{4}{5} = \frac{24}{25}$

< 1

$\frac{n+t}{b} - \frac{n-t}{b} < 1$

prove:

Other properties

- Monotone
- Bounded
- Periodic

$h(x)$

$h(-x) = -f(x)\cdot g(x)$